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# A BRIEF OVERVIEW OF THE MIDDLE CLARK FORK RIVER FISHERY MONITORING STUDY:

## Evaluation of the Effects of Pulp and Paper Mill Effluents on the Fish Population

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Ken,

This is the overview/outline which we put together last fall for public consumption. As I explained, it is an over simplification of our effort and does not include some areas we are getting into like trout rearing habitat assessment, instream flow, etc.

Background

In July of 1983 Champion International Corporation applied to the Water Quality Bureau of the Montana Department of Health and Environmental Sciences for a modification of their waste water discharge permit for the Clark Fork River. If granted, the modified discharge permit would allow Champion to release pulp mill effluents into the Clark Fork River on a year round basis. Under its existing permit the mill was limited to discharging pulp mill effluents only during spring high water. The permit modification was requested because Champion indicated its rapid infiltration system, a collection of gravel ponds to treat effluents, was becoming clogged to the extent that treated effluents would have to be released year round.

After a preliminary environmental review, the Water Quality Bureau issued a temporary permit on April 10, 1984, which allows Champion to release treated pulp mill effluents into the Clark Fork River on a year round basis for the next two years. [redacted] This led to an intense debate over the existing and future impacts of pulp mill effluents on the river. Trout Unlimited and other environmental groups demanded an Environmental Impact Statement be completed before issuance of a permanent modified permit in two years. This was followed by numerous negotiations between Champion and the groups in an attempt to work out an agreement that would be acceptable to all sides and keep the issue out of court.

By the end of March 1984 a final agreement was reached that embodied the following points:

1. The State of Montana will prepare an Environmental Impact Statement at a cost of $200,000 before issuing a permanent modified discharge permit.

2. The Montana Department of Health and Environmental Sciences will monitor water quality from Turah to the Idaho line and attempt to identify all major sources of pollution and evaluate effects of pulp mill effluents on the water quality of the Clark Fork River. In conjunction Idaho agencies will test for impacts on the river in Idaho, including Lake Pend Oreille.

3. The Montana Department of Fish, Wildlife and Parks will undertake a two year $100,000 study financed by Champion to evaluate effects of pulp mill effluents on the Clark Fork River fishery.

4. Champion agreed to sponsor an alternative methods study to consider technologies that would reduce or permanently eliminate discharges of pulp mill effluents into the river.

5. A twelve member technical advisory committee will meet on a regular basis to oversee the process. The committee includes the broad based representation of Trout Unlimited, the Idaho Wildlife Federation, the Montana Environmental Information Center, the Green Monarch Coalition, Missoula/Mineral/Sanders County Commissioners Association, the Missoula County Health Department, the Water Quality Bureau, Fish, Wildlife and Parks and Champion International Corporation.

Although the agreement does not represent a final solution, a thorough two year study will begin to provide information that is needed to evaluate influences of the Champion Mill on the Clark Fork River.

Scope of the Middle Clark Fork Fishery Study

The study area extends for about 120 miles from Milltown Dam to the confluence of the Flathead River. To evaluate the river's ability to safely assimilate additional quantities of pulp mill wastes, the current status of sport fish populations must be determined. Although fifteen species of fish are known to occur in the middle Clark Fork River, the bulk of the sport fishery is provided by rainbow trout along with a few cutthroat, brown and bull trout. The study will attempt to evaluate effects of pulp mill effluents on trout populations by assessing trout population characteristics in the river in areas upstream and downstream from the pulp mill effluent and by monitoring trout reproductive success in areas upstream and downstream from the effluent.

Trout population characteristics will be determined by making population estimates. Factors which will be estimated include the number and biomass of trout per mile, species composition, condition factors, growth rates, age structure and mortality rates. Fish will be collected to make trout population estimates using boom suspended electrofishing apparatus. Much of the field work for this phase of the study will be accomplished at night because efficiency of the electrofishing system is significantly better at night than during day time. Preliminary findings from this phase of the study will be available by late summer of 1985. Trout population characteristics will be compared in study areas upstream and downstream from the pulp mill effluent to evaluate influences of the mill on the sport fishery.

Trout reproductive success will be monitored through a bioassay of trout egg and fry survival in the intergravel environment in study sites upstream and downstream from the pulp mill effluent. Egg and fry survival will be monitored for brown trout, a fall spawner, and for rainbow trout, a spring spawner. Egg and fry survival are being evaluated because the egg through emergent fry stage in the life cycle of trout may be relatively more vulnerable to possible influences of pulp mill pollutants than life stages after the trout fry have emerged from the spawning gravels.

Trout spawn in relatively shallow gravelly areas of the river with moderate current velocity. After a depression is dug in the spawning gravel by a female, eggs deposited in the depression by the female are fertilized by an accompanying male and covered over with four to eight inches of spawning gravel. Water quality factors of possible concern in the intergravel environment which could be influenced by pulp mill effluents include dissolved oxygen, pH, ammonia and fine sediments. Additional water quality parameters of concern may be identified during the course of investigation. Preliminary results from this phase of the study will also be available by late summer of 1985.

Study Design Problems

There are several problems in designing this study to evaluate effects of pulp mill effluents on the sport fishery. First, the study is intended to document an impact from year round discharge of effluent from Champion's mill after the discharges have already begun. Second, there is very little baseline information on the condition of fish populations in areas downstream from the Champion discharge prior to the year-round discharge situation which now occurs. Third, the time frame for the study to assess impacts of the pulp mill is limited to two summer and one winter field seasons. This time frame may be too short to provide an adequate assessment. Fourth, there are many other water quality problems in addition to pulp mill effluents which may affect the Clark Fork River fishery. Additional water quality factors which may be influencing the fishery include Missoula sewage treatment plant

effluents, potentially toxic heavy metals originating from mine tailings in the upper Clark Fork drainage and fine sediments originating from various human related activities which could impair trout food production or trout reproductive success.

For these reasons, the scope of the study has been broadened with additional funding and assistance being provided by the Department of Fish, Wildlife & Parks. A study funded by the department is in progress to determine the relative importance of various tributaries as sources of recruitment for Clark Fork River trout populations. In addition, resident sport fishery values of the tributaries will be assessed and appropriate management recommendations will be made to maintain or improve fishery values of important tributaries.

To assist in identifying the potential influence of toxic metals on aquatic biota, DFWP will analyze crayfish tissue samples. Potentially toxic heavy metals originating from mine tailings in the upper Clark Fork drainage are gradually diluted as the Clark Fork receives more good quality dilution water from downstream tributaries. However, monitoring has not been intensive enough, particularly from Milltown Dam downstream, to determine how often, if at all, metals criteria are exceeded. Crayfish were chosen as an indicator organism because their movements are confined to a relatively small area. Metals concentrations in crayfish exoskeletons may prove to be a good integrator of past history of exposure to metals.

The Department of Fish, Wildlife and Parks also believes that there is a need for a comprehensive evaluation of the Clark Fork River system which cannot be accomplished within the scope of ongoing studies. The comprehensive study should include quantification of instream flow requirements for sport fish in the main river as well as major tributaries, expand sampling to below the confluence of the [redacted] River, assess seasonal and temporal distribution and movements of sport fish during both juvenile and adult life stages and identify interactions between fish populations and water quality relative to the influence of tributary streams.

Some of the above mentioned activities will be studied under continued redirection of department effort to the Clark Fork River. New funding will probably be required to complete portions of the comprehensive evaluation. Although the comprehensive evaluation cannot be completed in the short time frame required for the Champion Environmental Impact Statement, the data collected to that date will be made available and used.

Addendum: The Department of Fish, Wildlife and Parks is assessing the potential influence of pulp mill effluents on the taste of sport fish in the Clark Fork River. Taste tests will be conducted at an Oregon State University lab to evaluate the concentration at which pulp mill effluents adversely taint the taste of desirable sport fish. Results of these tests will be available sometime in 1985.

Outline
Middle Clark Fork River Fishery Monitoring Study

I. Assessment of Influences of Pulp Mill Effluents on Trout Population Characteristics Including:

1. Number and Biomass (pounds) of Trout/Mile
2. Trout Species Composition
3. Condition Factors
4. Growth Rates
5. Age Structure
6. Mortality Rates

study sections:
Milltown
Missoula
Huson
Superior

Method: Fish will be sampled with boom suspended electrofishing apparatus and estimates will be made using a mark/recapture technique.

II. Assessment of Influences of Pulp Mill Effluents on Trout Reproduction. Bioassay of brown and rainbow trout egg and sac fry survival in the intergravel environment. Intergravel water quality parameters of possible concern which could be influenced by pulp mill waste products include dissolved oxygen, pH, ammonia and fine sediments. Bioassay sites include:

1. Council Grove Site - just upstream from Champion effluent
2. Champion site - immediately downstream from Champion effluent
3. ~~Alberton~~ Site - downstream from the end of the pulp mill effluent mixing zone (about 20 ~~miles~~ 25 downstream from the mill)

Method: Trout egg and fry survival will be monitored with fiberglass screen egg bags placed in the intergravel environment and with fry emergence traps placed over redds. Intergravel water quality samples will be collected using standpipes. Stream substrate samples will be collected using a McNeil core sampler.

III. Assessment of the Potential Influence of Toxic Heavy Metals on Aquatic Biota. Crayfish were chosen as an indicator organism because their movements are confined to a relatively small area. Toxic metals concentrations in crayfish exoskeletons may prove to be a good integrator of past history of exposure of an indicator organism to metals. Sampling locations for crayfish will include below Milltown Dam, below the Missoula sewage outfall, below the Champion outfall, in the Bitterroot River (control), near Superior, below the Flathead River, below Thompson Falls Reservoir and below Noxon Reservoir.

IV. A more comprehensive evaluation of the Clark Fork River system which cannot be accomplished within the scope of ongoing studies is needed. The comprehensive study should include quantification of instream flow requirements for sport fish in the river as well as major tributaries, expand sampling to below the confluence of the Flathead River, assess seasonal and temporal distribution and movements of sport fish during both juvenile and adult life stages and identify interactions between fish populations and water quality relative to the influence of tributary streams.

Outline
Middle Clark Fork River Tributary Study

I. Assessment of the Relative Importance of Various Tributaries as Sources of Recruitment for Clark Fork River Trout Populations.

II. Assessment of the Sport Fishery Values of Resident Fish Populations in Tributary Streams.

III. Develop Management Recommendations to Maintain or Improve the Fishery Values of Tributary Streams.

There are twenty-two perennial tributaries of the Clark Fork River between Milltown Dam and the confluence of the [redacted] River. The principle tributaries include Rattlesnake Creek, Mill, Sixmile, Ninemile, Petty, Fish, Trout, Cedar, Tamarack and Siegel creeks and the Bitterroot and St. Regis Rivers. Preliminary findings suggest the Bitterroot an d St. Regis rivers, and Fish, Rattlesnake, Trout and Cedar creeks may be important bull trout spawning tributaries. Bull trout are a species of special concern because of their scarcity in the middle Clark Fork drainage. The latter tributaries and others are probably important for mountain whitefish and brown trout spawning in the fall and for rainbow and cutthroat trout spawning in the spring. Monitoring of the tributaries during the spawning periods by electrofishing will aid in determining relative importance of various tributaries as spawning streams.